CYCLES OF SUICIDE

JOSEPH M. ROTHBERG

WALTER REED ARMY INSTITUTE OF RESEARCH

WASHINGTON, DC 20307

This ⟶

Today's clinical presentation ~~is the comparison~~ compares of suicides
in United States Army personnel, 1975-1982, and in the United
States , 1972-1978. ~~I intend to~~ The author presents ~~our~~ a current
epidemiological approach and points out some as-yet unresolved
aspects of this work in order to solicit comments from this
audience.

* DETERMINE IF THERE ARE ARMY-SPECIFIC FACTORS AMONG SUICIDE IN ARMY PERSONNEL

* Ho: THERE ARE NO DIFFERENCES IN THE TIMING OF ARMY AND US SUICIDES.

Figure 1. Research goal and working hypothesis.

The goal of this observational study is to try to determine
if there are meaningful fluctuations in the suicide data and to
provide an analysis of the data base that identifies the corre-
lates of any of these changes in the rates.

Figure 2. Weekly values of the numbers of suicides in United
States Army personnel, 1975-1982 (note reversed scale).

Our Army data are the 834 suicides recorded during calendar years 1975 through 1982. These were 93% enlisted soldiers and 95% male. This is a sparse data set for the analysis of day-to-day trends since most of the 2922 days had no suicides. Figure 2 shows the number of suicides per week (the range is 0 to 7) from 1975 on the right edge thru 1982 on the left.

SUICIDE IN UNITED STATES ARMY PERSONNEL, 1975-1982
ANNUAL RATE OF SUICIDES PER 100,000 AVERAGE STRENGTH
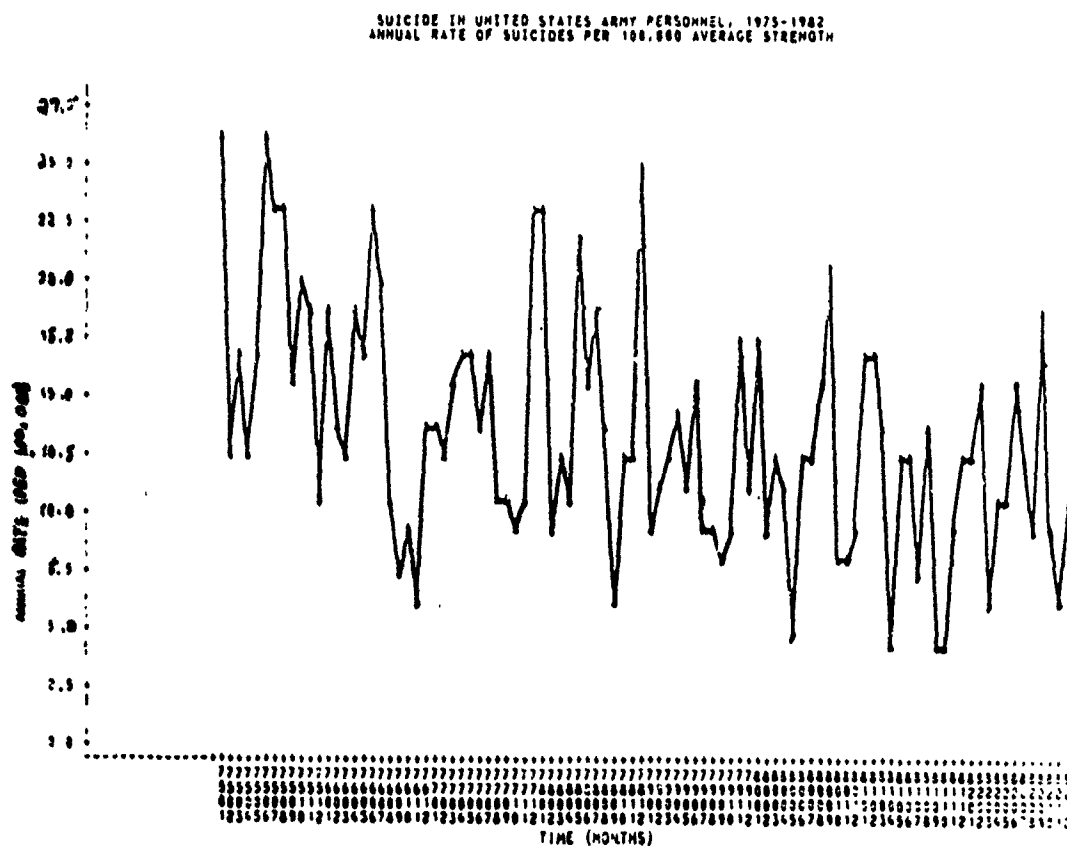

TIME (MONTHS)

Figure 3. Monthly values of the annual rate of suicide (per 100,000) in United States Army personnel, 1975-1982.

Figure 3 shows the annual rate of suicides (per 100,000 average strength) in each month from January 1975 ('7501') through December 1982 ('8212').

As a starting point, we make the assumption that a population of soldiers will have the same suicide rate as the civilian population of the same age and sex. On a bi-annual basis, this turns out to be not entirely true. For each of the four bi-annual suicide reports (1,2,3,4), the male suicide rate is uniformly lower for the Army. For the females in the Army, their rate is not as reduced as is their male counterpart. Over all, the interpretation that the Army is a supportive social institution that protects against suicide is not contradicted.

Beyond this "zeroth level" comparison, the next set of questions were prompted by the paper of MacMahon (5) who reported on 185,887 suicides registered in the United States during 1972-1978. Her data presentation used the standard social units of time (week, month, year) and the lunar month. The percentage departure from the mean was plotted against the time span and cycles are apparent in the plots for all but the lunar month data. The Army data have been similarly arrayed and plotted along with the MacMahon data. The overlap of these two data sets is not complete since suicides by soldiers outside of the United States are only reported in the Army data. I will discuss these in order of increasing variability (distributing the same 834 cases into more intervals results in an increase in the variability).
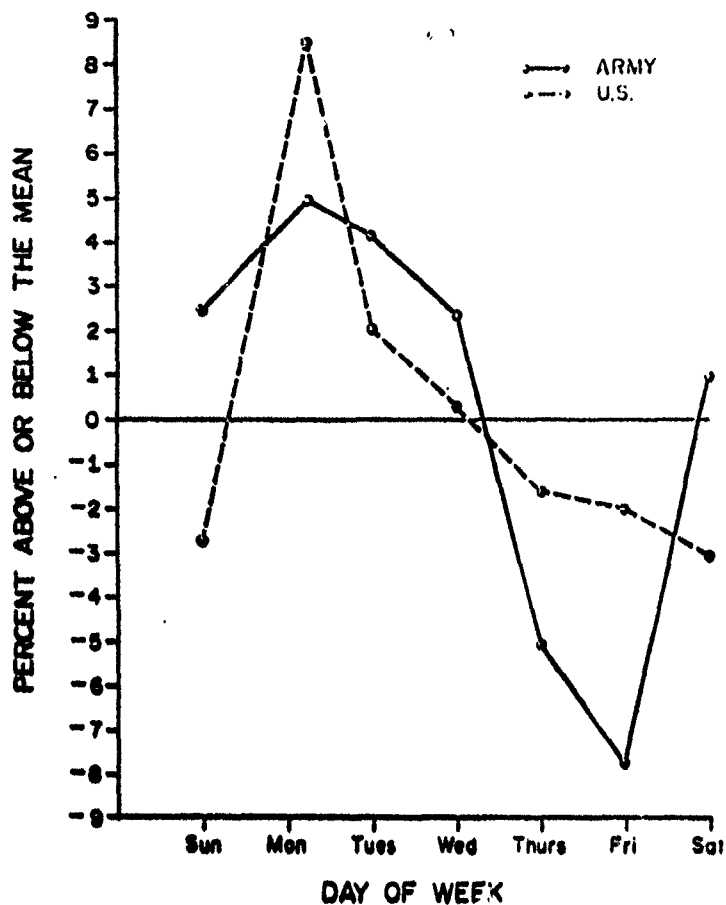
Figure 4. Deviation from the mean by day of the week for United States civilian population, 1972-1978 (U.S.) and United States Army, 1975-1982 (ARMY).

The day of the week data is shown in Figure 4. The two distributions appear to be quite similar. Both the Army and United States data show a Monday increase and a dip in the end of the week. For the United States, Saturday is the minimum while Friday is the minimum for the Army. The maximum departure from the mean is about the same for both data sets.

DAY OF WEEK

$$CHI-SQ = 1.24 \ , \ N = 7$$

$$P \ (1.24, \ 6) = 0.97 \ , \ \text{NOT SIG.}$$

Figure 5. Statistical test of day of week effect.

There is no significant difference between the two distributions on a chi-squared test.
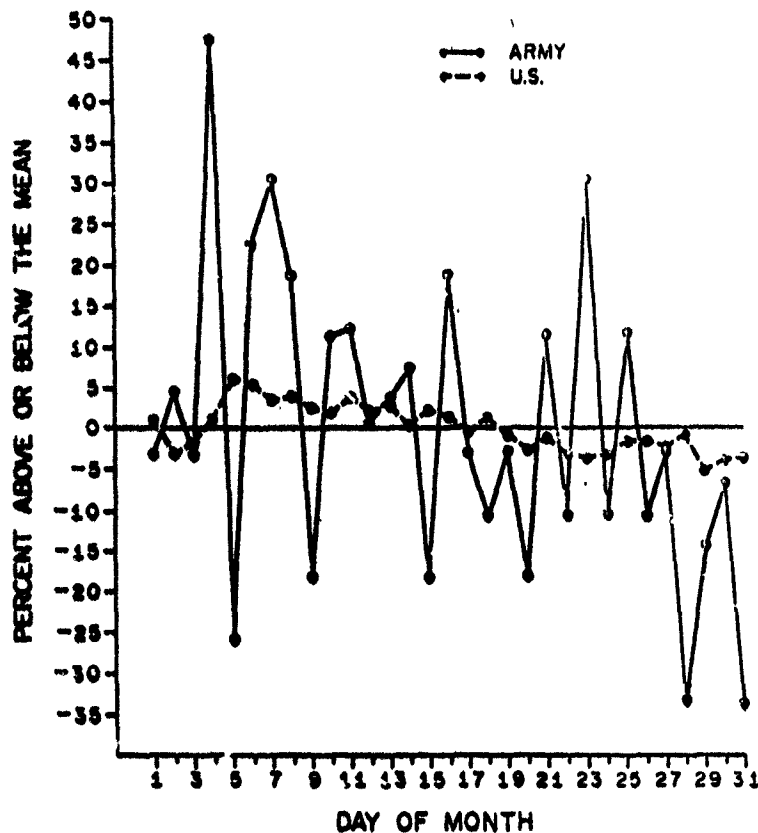

Figer 6. Deviation from the mean by month of the year for United States civilian population,1972-1978 (U.S.) and United States Army, 1975-1982 (ARMY).

The month of year data are shown in Figure 6. Although both distributions have two relative peaks, they do not occur at the same time nor are they of the same amplitude. For the United States data, the peaks are less than 5% and occur in May and August/September. The Army has a peak in June that is almost 30% above the mean and a Jaunary peak is almost 25% above the mean.

MONTH OF YEAR

CHI-SQ = 22.56, N = 12
P (22.56, 11) = 0.02 , SIG.

Figure 7. Statistical test of month of year effect.

The probability that these distributions are the same is only
0.02. Some military reassignments to new posts occur at about
those times. The stress of relocation is a plausible precipitant
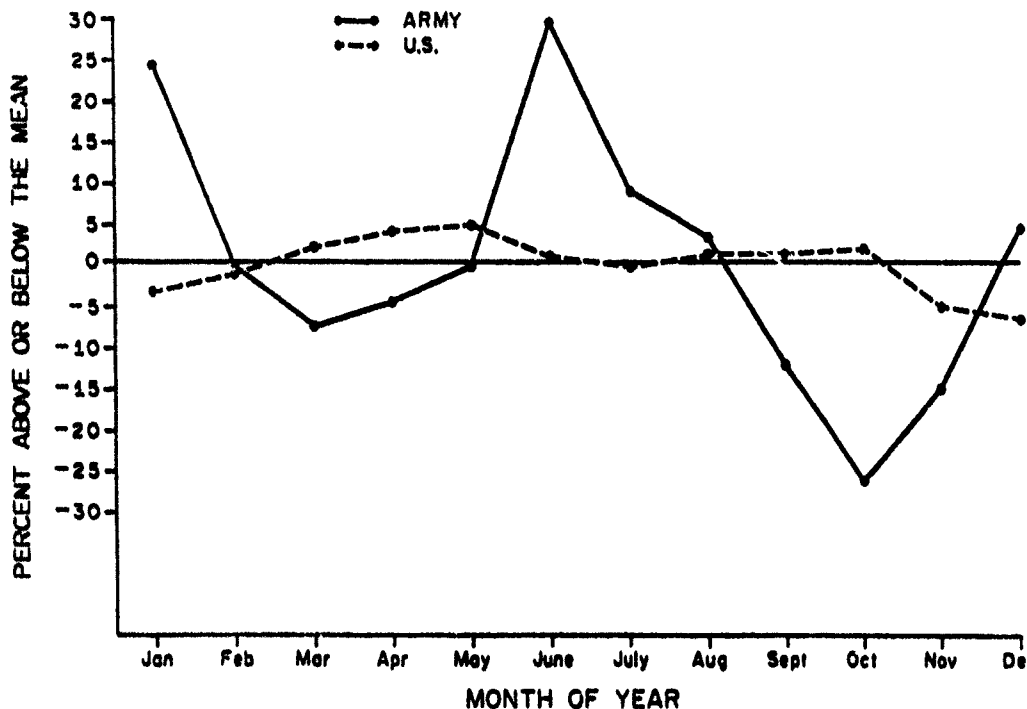of suicide.

Figure 8. Deviation from the mean by day of the month for United States civilian
population, 1972-1978 (U.S.) and United States Army, 1975-1982 (ARMY)..

The day of month data are shown in Figure 8. The United
States data shows a peak on the fifth of the month followed by
decreasing values until the end of the month. The Army data have
a great deal of variability but, using a five day sliding average
(not shown) there appears to be a set of peaks early in the month
(on the 4th, 6/7th, and 10th) and a peak late in the month (on
the 22nd) and a dip at the end of the month(on the 28th).

DAY OF MONTH

CHI-SQ = 26.03,　N = 31
P (26.03, 30) = 0.67 ,　NOT SIG.

Figure 9. Statistical test of day of month effect.

There is no significant difference between the distributions using a chi-squared test. Pay day in the Army is the last working day of the month and some of the suicides may be due to financial problems that become apparent close to pay day and the first-of-the-month bills.

What we have done in discussing these figures was to average the eight years of data assuming that there are cycles of psychosocial events occurring at specified time· which drive these suicides. The increased rates at the start of the week, the start of the month and the start (and middle) of the year lend support to the assumption that there are cycles.

The question of cycles within the Army suicide data was looked at directly but only briefly. We did a spectral decomposition of the daily suicide counts using the SAS procedure SPECTRA.

SAS

PROCEDURE SPECTRA WHITETEST

2916 DAYS , 831 SUICIDES

Ho: THE LARGEST OBSERVED PERIODOGRAM ORDINATE IS THE LARGEST IN A SIMILARLY SIZED RANDOM SAMPLE

H'o: THE FREQUENCY SPECTRUM IS NOT DIFFERENT FROM WHITE NOISE.

FISHER'S KAPPA = 7.66 , 1457 D.F.

P (7.66 , 1457) > 0.10 , NOT SIG.

Figure 10. Statistical test of periodogram randomness.

Since the fast fourier transform algorithm of that procedure requires that the number of data points have a largest prime divisor less than or equal to 23, the analysis was done with the first 2916 days. The null hypothesis that the largest observed periodogram ordinate is the largest in a similarly sized random sample was tested with Fisher's Kappa. The value of 7.66 with an n of 1457 two-degree-of-freedom periodigram ordinates has a p > 0.1. With that negative result, it appears that any search for further structure within the Army suicide data would be inappropriate.

The inability to proceed further with the analysis of the Army suicides for cycles in a direct fashion shouldn't interfere with having clever ideas about the cyclic properties of the United States data and then testing if the Army data looks like the United States data. And it is at this point, needing some clever ideas, that I solicit the audience to suggest ways to look at this relatively small but important data set.

REFERENCES

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5. Short-Term temporal cycles in the Frequency of Suicide, United States, 1972-1978. MacMahon, K., AM J EPIDEMIOL 117:744-750,1983.